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“Solidarity in a competing world —
fair use of resources”

Effects of Water Restriction on Quality of Goat Manure

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Abstract

Water scarcity is a major challenge affecting agriculture in tropical and subtropical drylands. Since agriculture is the backbone of the majority of countries in these regions, it is important to make wise use of locally available sources of water and nutrients when aiming at optimising resource use efficiency. Thus our objective was to determine the effects of restricted drinking water intake of goats, known to be tolerant to such limitation, on the quality of their faeces and the consequences for utilisation of such manure as soil amendment in crop production.

Two trials were conducted at Sultan Qaboos University, Muscat, Oman, during summer (August-October) 2013 and 2014. Set up as a complete Latin Square Design, each trial included six adult male Batinah goats subjected to three regimes: drinking water offered *ad libitum* (100%), water restricted to 85% and to 70% of individual *ad libitum* consumption. During three 7-day experimental periods preceded each by three weeks of adaptation, faeces were quantified and analysed for concentrations of dry matter (DM), nitrogen (N), neutral detergent fibre (NDF) and acid detergent fibre (ADF) following standard protocols. The mixed model procedure in SAS was used to conduct ANOVA with year, period and treatment as fixed effects and animal as random effect.

Water restriction decreased the quantitative DM excretion in both years but increased the DM concentration of faeces. Quantitative and qualitative NDF excretion decreased when water was restricted, whereas no change occurred with respect to the amount and concentration of faecal N, indicating a slight shift of N excretion from urine to faeces. In 2014, quantitative and qualitative ADF excretion was higher ($p < 0.05$) in water restricted than in unrestricted goats. Since this fraction consists of slowly decomposable organic carbon (C), faeces of water-restricted goats may stabilise soil organic matter when applied as manure, which is very relevant for heavily weathered or sandy tropical and subtropical soils. As recalcitrant organic C fosters short-term N immobilisation in the soil, immediate N-losses, which often occur directly after manure application, may also be reduced in manure obtained from water-restricted goats.

Keywords: Desert conditions, nutrient cycling, small ruminants, water restriction